

Teacher's Guide

Drug Danger: IN THE BRAIN



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- Suggested Instructional Procedures
 - Script

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Written by Barri Golbus

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Consultants:

**Joyce Traina, M.D.
Medical East, Braintree, MA**

**Ken Newbury, Ph.D.
Director, Student Assistance Program
Toledo, OH Public Schools**

**Barbara A. Weigand, M.A., C.A.A.C.
Alcohol/Other Drug Prevention Consultant
and Trainer**

DRUG DANGER: IN THE BRAIN

Time: 12:00

PROGRAM OVERVIEW

The brain controls everything a person does, thinks, remembers, learns, and feels. So it makes sense that we would want our brain to work as perfectly as possible. We wouldn't want to take any chances with it. But that's what people do when they take drugs that work in the brain, "psychoactive drugs," without a doctor's supervision. Psychoactive drugs can change the way the brain sends messages to and from other parts of the body. They make those changes on or near nerve cells by blocking, slowing down, speeding up, or chemically changing the message carriers, or *transmitters*. Psychoactive drugs also can change the area on nerve cells that receive the transmitters. Some drugs work in the "pleasure center" of the brain. They can change the nerve cells there so that a person cannot feel normal unless he or she takes the drug.

STUDENT OBJECTIVES

After viewing this video and participating in the suggested activities, students should be able to do the following:

- (1) List the different ways psychoactive drugs can affect the brain's ability to send and receive messages.
- (2) Explain, in basic scientific terms, the mechanism by which messages are sent in and out of the brain.
- (3) Draw and label the major parts of the nerve cell.
- (4) Tell three reasons why illegal psychoactive drugs are so dangerous.
- (5) Discuss the effects of some drugs on the pleasure center of the brain.

SUGGESTED LESSON PLAN

1. Introduction

Discuss the differences between *drug use*, *drug abuse*, and *drug dependency*. Help your students understand that drug use can be beneficial, and that drug abuse -- including taking drugs for recreational purposes -- is unhealthful. Drug dependency is an unhealthful state in which a person depends on a drug to feel normal. Ask your students if they've ever taken a drug. What's the

difference between taking an aspirin or an antibiotic and taking crack? (One is drug use, the other is drug abuse). Introduce the concept of psychoactive drugs. Discuss the difference between a drug that changes the brain's chemistry, and a drug that may work elsewhere in the body, such as penicillin that fights a lung infection.

2. Pre-Viewing Activities

If you feel it will be helpful, write on the chalkboard and define the following terms used in the presentation: *nerve pathway, nerve cell, dendrite, axon, synapse, transmitter, psychoactive drugs, pharmacist, drug habit, drug addict, chemically dependent.*

Tell your students that they will see a video that explains how psychoactive drugs work in the brain. Alert the class that a great deal of information will be given, so they will have to give the program their undivided attention.

List the five student objectives on the board. Tell the class that after viewing the presentation and after participating in the follow-up activities, they will be expected to meet those objectives.

Present the video. A transcript of the narration is found on pages 8-15.

3. Post-Viewing Activities

Ask your students to explain how psychoactive drugs can change the chemistry of the brain. Then compare the nerve pathways in the

brain to a telephone system with wires and switching stations. If someone were to somehow disrupt the lines, what would happen? The message wouldn't get to the proper place, or would be garbled. Do psychoactive drugs act similarly? In what ways?

Invite a physician to class to discuss the differences between drug use and drug abuse.

Invite a police official, or another member of the criminal justice system, to speak to your class about the role drug abuse plays in your community's crime rate.

TRANSCRIPT OF THE VIDEO

Note: Many of the biological phenomena discussed in this video take place at the molecular level. Because intermediate grade students do not have the background to fully understand the biochemistry involved, concepts have been simplified in the animated sequences by taking some license with scale and illustrative methodology.

What does a person who rides a bike, and another who paints a picture, have in common? For that matter, what do people who paint have in common with those who clown around or read?

Well, all of them are doing things that are controlled by their brains. In fact, a person's brain controls

everything that he or she does, thinks, remembers, learns, or feels.

So it just stands to reason that you'd want your brain to work as perfectly as possible. You wouldn't want to take any chances with it.

But that's what people do when they take certain drugs without being under a doctor's supervision -- a very foolish thing to do. To understand exactly how foolish, you need to know a little bit about how the brain works.

To do its many jobs, the brain has to receive messages from all over the body, figure out what those messages mean, and then decide what to do about them.

Let's take an example. You look at a clock to see what time it is. Most of us would think that our eyes are seeing the clock and the time on it.

But that's not really what's happening. Our eyes see only the clock's shapes and colors. It's our brain that tells us that those shapes and colors are a clock.

Looking at what happens in a little more detail, let's say that you're taking the dishes out of the dishwasher and they're still hot.

The nerves in your fingers feel the heat, and then send a set of signals -- very rapidly -- along a pathway made up of other nerves until those signals reach the part of your brain responsible for sensing heat.

Only when the signals are in that part of your brain -- and not before -- do you become aware that the plate is hot.

Immediately, a second set of signals is sent to another part of your brain, a part responsible for arm and hand movement.

Once those signals are received, the brain sends still another set of signals, this time back to your hand. The signals say, in effect, "pull it back -- and do it fast!"

The important thing to remember is that the brain makes you aware that your fingers hurt. Now, the amazing thing is that all those signals go back and forth in just a fraction of a second.

Actually, there are lots of other amazing things that happen in the brain, too.

Perhaps one of the most remarkable of all is that every second millions upon millions of messages move back and forth along the brain's nerve pathways without ever getting mixed up. One signal might say, "You're looking at a turtle." At the very same time, another signal might say, "You're hungry." And, "Remember to get that calculator for math class."

Of course, you're not always aware that all those messages are moving around in your brain. But they are.

They do it by moving from one very tiny part of your

brain called a "nerve cell" to another nerve cell -- then to another, and another, until the message gets to where it's supposed to go.

Scientists think that there are about 10 billion of those nerve cells in each person's brain.

Nerve cells have branches called dendrites. They also have a long structure called an axon.

A message moves along the axon until it gets to the end. It then moves across a gap, called a "synapse," to a nearby dendrite, where it may be received.

If it is, the message moves from there into the cell body, down the axon, across the next synapse, into the next dendrite -- and so on, and so on, until it gets to its destination.

As long as the messages get across each synapse in a normal manner, the brain can do its job the way it's supposed to.

The message is carried across the synapse by chemicals called "transmitters." The brain makes those chemicals.

Doctors sometimes use their understanding of transmitters when prescribing medicines.

For instance, if a patient complains of back pain, the doctor may prescribe a medicine -- seen here as the blue diamonds -- that blocks the transmitters that carry the back pain message.

In that way, the patient won't feel the pain, or won't feel it quite so much.

Sometimes people require medicines that will slow down the transmitters, and doctors may use medicines which do that, also.

In addition to drugs that block and slow down messages, there are drugs that can speed up and even change the messages.

So drugs that work in the brain can be very powerful. They can change the way the brain works.

That's why, by law, most drugs that affect the brain's behavior -- they're called "psychoactive" drugs -- can be used only under a doctor's supervision.

Only doctors, pharmacists, and a few other health professionals have the training to know how drugs may work in the brain.

And doctors only use and prescribe medicines made by companies that carefully control and carefully check everything they sell. In that way, the medicine will work as intended.

Of course, that's not necessarily the case with drugs sold illegally, or gotten from an acquaintance, or from a big brother or sister. Often, those drugs are not pure; they have things in them that may be extremely dangerous, even more dangerous than what's believed to be in them.

And, of course, people who sell drugs in the park -- or on street corners or in the alley -- don't really know anything about what they're selling, even though they might pretend that they do. They're interested in only one thing -- making money.

They have no interest in helping a person solve a health problem, as do doctors.

Because illegal drugs are often impure, and because people normally don't know how to use psychoactive drugs properly without a doctor's instructions -- and because these drugs can be so powerful -- they often make the people who use them very sick.

Sometimes persons who use illegal drugs even die. But even if they don't, their drug abuse can mess up their lives in terrible ways.

First, youngsters who drink beer, wine, and liquor are breaking the law -- and anyone who takes psychoactive drugs such as crack, cocaine, or heroin is also doing something unlawful.

In addition, abusers often steal and rob to get money for their drugs. Police officials say that about three out of every four thieves have a drug habit.

And, of course, the drugs abusers take can destroy their health. So why would a person ever take drugs? To answer that question, let's take another look inside the brain.

The part of the brain that controls good feelings, or pleasure, is where many illegal drugs work.

Normally, that part of the brain begins working when our favorite ball player hits a home run, or when we get a good grade, or when we curl up with a favorite book, or do anything else that makes us happy.

But when a drug goes to the pleasure center of the brain, several things can happen.

First, the drug can change the dendrites there so that they will work only with the drug. That means the drug abuser cannot feel pleasure or happiness from normal things.

Only drugs will make that person feel any pleasure! That's bad enough, but something even worse happens.

In many instances, the brain, after awhile, becomes used to the drug. So in order to feel just normal -- not even happy -- the abuser must take more and more drugs.

In time, the brain changes so much that nothing matters to the person except drugs. The unfortunate individual whose brain has reached that state is said to be "chemically dependent," or, more commonly, a "drug addict."

Chemically dependent people depend on drugs to feel normal, and they need lots of help to stop taking drugs.

Usually, they must go to places like treatment centers, where they're shown how to stop taking drugs -- and how to stay off them.

But because their brains remember how the drug turned on the pleasure center, they will always want to try the drugs again, although they know it is dangerous -- and even though they may really want to remain drug-free. In other words, staying off

drugs can be very hard for persons who once took them: it can be a struggle every day.

So if a person ever offers a drug such as pills, marijuana, beer or another kind of alcohol to you, the smartest thing to do is refuse.

It's true that refusing can be awfully hard, especially when the other kids say things like, "One time won't hurt," or "Don't be a chicken," or "Everybody's doing it."

So if you're tempted to try, it may be helpful to stop and think what drugs can do to your brain.

Remember that they change its normal way of working -- and they can change it in very dangerous ways.

Remember that drugs sold illegally often contain dangerous impurities that may cause serious illness and, in some cases, even death.

Remember that psychoactive drugs -- and again, that includes beer and other kinds of alcohol -- can destroy a person's life.

That's hard to believe sometimes, especially if you see others using alcohol or other drugs, and seeming to be none the worse for it.

But part of growing up is understanding that what you see outside doesn't always show what's going on inside.

It can take time for the destruction to be detected. But that doesn't mean the destruction isn't taking place.

Because in drug abusers, it is.